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EXAMINER MUTSCHLER, BRIAN L				
ART UNIT 1753		PAPER NUMBER		

DATE MAILED: 12/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

### Application No.

09/809,295

### Applicant(s)

YOSHIOKA ET AL.

### Examiner

Brian L. Mutschler

### Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 November 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 82-85 is/are pending in the application.
- 4a) Of the above claim(s) 5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 82-85 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other:

## **DETAILED ACTION**

### ***Comments***

1. Applicant's cancellation of claims 6-81 and addition of claims 82-85 in the response submitted November 5, 2003, is acknowledged.
2. The objection to the specification has been overcome by Applicant's amendment to the specification.

### ***Election/Restrictions***

3. Applicant has requested reconsideration of claim 5 on the grounds that the claim contains similar limitations as the elected claims. However, claim 5 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Claim 5 is distinct from the originally elected claims because the claims are related as apparatus and method of using the apparatus. The apparatus can be used to perform a process different from that of claim 5, such as a method requiring a different concentration of oxygen or a method that does not contain any oxygen.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 5 is still withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

4. This application contains a claim drawn to an invention nonelected without traverse in Paper No. 20030516. A complete reply to the final rejection must include

cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

***Drawings***

5. The proposed drawing corrections received on November 5, 2003, are acceptable.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 3, 82 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaki (U.S. Pat. No. 6,454,918) in view of Woodruff et al. (U.S. Pat. No. 6,309,524) and in view of Belongia et al. (U.S. Pat. No. 6,391,209).

Regarding claims 1 and 82, Sakaki discloses a cup-type plating apparatus for plating wafers comprising a plating tank **1** for holding a plating liquid, an anode **8** immersed in the plating liquid, and a diaphragm **12** separating the anode **8** from the wafer substrate **3** (fig. 1; col. 7, lines 1-58). The apparatus further comprises separate plating liquid circulating systems comprising a main solution tank **21** that provides the plating liquid to the substrate and an auxiliary tank **22** providing plating liquid to the chamber containing the anode **8** (fig. 4; col. 7, line 59 to col. 8, line 34). The wafer **3** is

placed over the opening at the top of the plating tank **1** and is attached to a wafer support **2** capable of holding a substrate at a substrate position and comprising a cathode (not shown) and a seal packing **5** for preventing leakage of the plating solution beyond the front surface of the wafer **3** (fig. 1; col. 7, lines 1-7).

Sakaki further teaches, "Existence of gases [evolved from the anode] is undesirable as they influence the current density" (col. 3, line 62 to col. 4, line 5). Sakaki also discloses, "adjustment of the plating solution due to consumption of additives will become easier" by the use of separate circulation systems (col. 4, lines 6-18).

The apparatus of Sakaki differs from the instant invention because Sakaki does not disclose the following:

- a. The substrate holder is capable of opening and closing, as recited in claims 1 and 82.
- b. A deaerating unit provided in at least one of the plating liquid circulating systems, as recited in claims 1 and 82.
- c. The deaerating unit comprises a deaerating membrane and a vacuum pump, as recited in claims 3 and 84.

Regarding claims 1 and 82, Woodruff et al. disclose a cup-type plating apparatus for plating wafers comprising a plating tank, an anode immersed in plating liquid, and a substrate holder (fig. 1). In one embodiment, the substrate holder (reactor head) **30** comprises an outer body assembly **625** having an upturned lip **730** positioned on the front of the substrate **25**, which forms a seal to protect the contact **610** by forming a

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barrier to the electroplating environment (fig. 18; col. 13, lines 30-39). The substrate holder **30** is mounted on a lift/rotate apparatus **80** for rotating and positioning the substrate **25** for plating (col. 6, line 60 to col. 7, line 10). The positioning of the substrate **25** by the substrate holder **30** therefore opens and closes the top of the plating apparatus.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the substrate support of Sakaki to use a substrate holder as taught by Woodruff et al. because the substrate holder of Woodruff et al. automates the positioning of the substrate by using a lift/rotate apparatus, which would make the process more efficient.

Regarding claims 1, 3, 82, and 84, Belongia et al. disclose system and method for treating plating baths such as the plating baths used for the plating of semiconductor wafers and circuit boards (col. 1, lines 16-18). The system of Belongia et al. treats the plating liquid from the plating baths to remove contaminants and to adjust the plating solution for reuse and comprises sensors, such as gas concentration detectors, as well as a degasser to remove gases from the plating liquid (col. 7, line 65 to col. 8, line 10; col. 11, lines 16-23). The degasser can comprise a membrane and a vacuum on one side opposite the fluid.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Sakaki to use a deaerating unit as taught by Belongia et al. because Sakaki teaches that the existence of evolved

gases is undesirable and the degasser of Belongia et al. is an efficient means for removing such undesirable gases. It would also have been obvious to one having ordinary skill in the art at the time the invention was made to have used a vacuum pump for providing the vacuum in the degasser of Belongia et al. because a vacuum pump is an efficient means for providing a continuous and consistent vacuum.

Regarding the limitations "for maintaining the concentration of dissolved oxygen in the plating liquid between 1 µg/l (1ppb) and 4 mg/l (4ppm)" and "the pressure on the decompressed side of said deaerating unit being controlled", the limitations are intended uses of the apparatus and do not further limit the structure. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

8. Claims 2, 4, 83, and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaki (U.S. Pat. No. 6,454,918) in view of Woodruff et al. (U.S. Pat. No. 6,309,524) and in view of Belongia et al. (U.S. Pat. No. 6,391,209), as applied above to claims 1 and 3, and further in view of Uzoh et al. (U.S. Pat. No. 6,113,769).

Sakaki, Woodruff et al. and Belongia et al. describe an apparatus having the limitations recited in claims 1, 3, 82, and 84 of the instant invention, as explained above in section 7. Furthermore, Belongia et al. also teach the use of sensors **18** for

monitoring the conditions in the plating liquid, wherein the sensor **18** can comprise gas concentration detectors (US '209 col. 7, line 65 to col. 8, line 10).

The apparatus described by Sakaki, Woodruff et al. and Belongia et al. differs from the instant invention because they do not disclose the use of a monitoring unit for monitoring the concentration of dissolved oxygen, as recited in claims 2, 4, 83 and 85.

Uzoh et al. discloses an apparatus for monitoring and controlling the plating baths to control the plating uniformity in process using electronic packages or silicon wafers for substrates (col. 3, lines 31-55). The apparatus comprises at least one sensor or monitor **31** for sensing and monitoring conditions in the plating liquid, wherein the sensor **31** can be an oxygen sensor "to monitor dissolved and/or non-dissolved oxygen content" (col. 4, lines 27-51).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus described by Sakaki, Woodruff et al. and Belongia et al. to use a monitoring unit for detecting the amount of dissolved or non-dissolved oxygen in the plating solution as taught by Uzoh et al. because monitoring and controlling the plating solution can improve the plating uniformity by maintaining consistent plating solution concentrations.

### ***Response to Arguments***

9. Applicant's arguments filed November 5, 2003, have been fully considered but they are not persuasive.



10. Applicant has argued that the claims are distinguished over the prior art of record because the prior art does not teach maintaining the oxygen concentration in the plating liquid between 1 µg/l and 4 mg/l (see page 20 of Applicant's response).

11. This argument is not persuasive because the added limitation is an intended use of the apparatus and does not further limit the structure of the apparatus. MPEP § 2114 states, "A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)." The recited use of the apparatus does not provide any additional structural limitations. Since the prior art of record teaches the combination of structural elements recited in the present claims, the rejection is deemed proper and is maintained.

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

  
NAM NGUYEN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700

blm  
December 10, 2003